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Addendum.

Since this note was drawn up, Mr. Maunder has found, from an examination of the photographs at Greenwich, that this Sunspot appeared on the Sun on 1891 November 15, when it came into view close to the east limb as a spot of considerable size. It was also photographed at its appearances in December 1891 and January 1892, so that it has persisted through five rotations, with, however, a remarkable progressive drift in latitude from about 17° S. to 30° S. Several magnetic disturbances have occurred during its presence on the Sun, three being subsequent to that on February 13, described above, viz.: March 1^{d} 0^{h} to 16^{h} (moderate), 0° 45′ in declination; March 6^{d} 9^{h} to 7^{d} 9^{h} (considerable), 0° 50′ in declination; March 11^{d} 10^{h} to 13^{d} 5^{h} (great), 1° 15′ in declination.

Royal Observatory, Greenwich:
1892 *March* 25.

On the Photographic Magnitude of Nova Aurigæ, as Determined at the Royal Observatory, Greenwich. By W. H. M. Christie, M.A., F.R.S., Astronomer Royal.

A telegram notifying the receipt by Dr. Copeland of an anonymous postcard, which announced the discovery of a new star in *Auriga*, was received at Greenwich at about 5 P.M. on Feb. 1, and a few hours afterwards Mr. Criswick obtained a photograph of the Nova with the 13-inch photographic telescope. Photographs of the new star have been taken at every available opportunity since, with exposures ranging from 15^{s} to 12^{m}, and the diameters of the images of the Nova and of certain comparison stars have been measured under the microscope with a filar micrometer, with a view to determining the changes in photographic magnitude of the Nova. Independently of this special object, the discussion has a general interest in relation to the problem of determining the magnitudes of stars for the photographic chart.

On each plate the diameters of the images of the Nova, of four Argelander stars (B.D. + 30°, Nos. 944, 949, 938, and 913), ranging from 8·2 to 8·7 mag. (Argelander), and of a 5·7 mag. star (B.D. + 30° 898), were measured, and the magnitude of the Nova was inferred from those of the comparison stars by means of the formula

$$m = 2{\cdot}5(\log t - 0{\cdot}97\sqrt{d}) + \text{const.}$$

given in the *Monthly Notices*, vol. lii., p. 146, the measures of the comparison stars being used to determine the value of the constant for each plate. The magnitudes of the four 8–9 mag.

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stars were taken from Argelander, and that of B.D. + 30° 898 from the *Harvard Photometry* and the *Uranometria Oxoniensis.*

The measures were made independently by Miss Everett and Miss Rix, some of the plates being also measured by myself, and the results obtained by each measurer have been kept separate, as there is decided evidence of personality. The values of the constant obtained from the measures of the four 8–9 mag. stars and of the 5·7 mag. star respectively, are also exhibited separately (as c_1 and c_2), with the values of the magnitude of the Nova, deduced by means of the mean values of c_1 and c_2 for the two or three exposures on each plate. As a rule, each measurer made four measures of each image of the Nova and of the 5·7 mag. star, and two measures of each image of each of the four 8–9 mag. stars.

The 5·7 mag. star, B.D. + 30° 898, is about 1° from the centre of the plate, and the image is somewhat diamond shaped. In this and other similar cases two diameters at right angles have been measured, and the geometric mean taken.

The results are tabulated below.

The initials AE, ER, and WC are those of Miss Everett, Miss Rix, and Mr. Christie respectively.

MAGNITUDES OF NOVA AURIGÆ, 1892.

Derived from comparison with four small stars, mag. 8·2, 8·2, 8·7, 8·7.

Date and Exposure.	Value of c_1.			Magnitude of Nova.		
	AE.	ER.	WC.	AE.	ER.	WC.
Feb. 1.		No. 247.	*Ilford Plate.*	Photogr. Mr. Criswick.		
7^m	10·22	10·30	10·23	4·29	4·60	4·53
Feb. 2.		No. 249.	*Ilford Plate.*	Photogr. Mr. Davidson.		
3^m	9·09	...	...	4·05	...	...
2^m	8·88	...	...	4·21	...	...
1^m	9·19	...	...	3·85	...	...
Mean	9·05			4·04		
Feb. 2.		No. 250.	*Ilford Plate.*	Photogr. Mr. Davidson.		
8^m	8·44	...	...	3·69	...	...
6^m	8·43	...	...	3·60	...	...
Mean	8·434			3·64		
Feb. 2.		No. 251.	*Lumière Plate.*	Photogr. Mr. Davidson.		
12^m	9·76	9·65	...	2·98	2·67	...
30^s	9·30	9·01	...	3·76	3·51	...
15^s	9·46	9·03	...	3·56	3·25	...
Mean	9·51	9·23		3·43	3·14	

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Date and Exposure.	Value of c_1.			Magnitude of Nova.		
	AE.	ER.	WC.	AE.	ER.	WC.
Feb. 3.		No. 255.	*Lumière Plate.*	Photogr. Mr. Furner.		
4^m	9·11	8·65	...	3·90	3·49	...
2^m	9·13	8·66	...	3·77	3·84	...
1^m	9·20	8·91	...	3·32	3·71	...
Mean	9·15	8·74		3·66	3·68	
Feb. 3.		No. 256.	*Lumière Plate.*	Photogr. Mr. Furner.		
8^m	8·59	8·24	...	3·35	3·54	...
6^m	8·51	8·00	...	3·75	3·82	...
Mean	8·55	8·12		3·55	3·68	
Feb. 3.		No. 257.	*Lumière Plate.*	Photogr. Mr. Furner.		
12^m	8·49	8·28	8·52	3·84	2·82	3·68
30^s	8·88	8·48	8·57	3·79	3·27	3·66
15^s	8·98	8·49	8·77	3·77	3·14	3·46
Mean	8·77	8·42	8·61	3·80	3·08	3·60
Feb. 12.		No. 262.	*Lumière Plate.*	Photogr. Miss Everett.		
12^m	9·14	8·72	8·83	4·28	3·75	3·82
30^s	9·20	8·50	8·43	4·38	3·32	3·45
15^s	9·59	8·74	8·71	4·08	3·37	3·12
Mean	9·28	8·65	8·65	4·25	3·48	3·46
Feb. 12.		No. 263.	*Lumière Plate.*	Photogr. Miss Everett.		
8^m	8·82	8·86	...	4·19	4·18	...
Feb. 13.		No. 264.	*Ilford Plate.*	Photogr. Mr. Criswick.		
8^m	8·48	8·50	...	4·20	4·23	...
6^m	8·71	8·42	...	4·12	4·31	..
Mean	8·60	8·46		4·16	4·27	
Feb. 13.		No. 265.	*Ilford Plate.*	Photogr. Mr. Criswick.		
12^m	8·61	8·04	...	4·18	4·26	...
30^s	8·45	7·96	...	4·83	4·43	...
15^s	8·53	7·89	...	4·98	4·53	...
Mean	8·53	7·96		4·66	4·41	

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Date and Exposure.	Value of c_1. AE.	ER.	WC.	Magnitude of Nova. AE.	ER.	WC.
Feb. 13.		No. 267.	*Ilford Plate.*	Photogr. Mr. Criswick.		
4^{m}	8·29	7·66	...	4·43	3·98	...
2^{m}	8·33	7·76	...	4·71	4·23	...
1^{m}	8·46	7·71	...	4·56	4·23	...
Mean	8·36	7·71		4·57	4·15	
Feb. 18.		No. 271.	*Ilford Plate.*	Photogr. Mr. Criswick.		
12^{m}	9·20	9·39	...	3·64	2·96	...
30^{s}	9·03	9·11	...	3·99	3·86	...
15^{s}	8·98	8·52	...	4·04	3·83	...
Mean	9·07	9·01		3·89	3·55	
Feb. 18.		No. 273.	*Ilford Plate.*	Photogr. Mr. Criswick.		
4^{m}	9·13	9·14	...	4·04	3·89	...
2^{m}	9·35	9·26	...	4·19	3·87	...
1^{m}	9·26	9·25	...	4·04	3·89	...
Mean	9·24	9·22		4·09	3·88	
Feb. 22.		No. 275.	*Mawson & Swan Plate.*	Photogr. Miss Rix.		
12^{m}	9·61	...	...	3·97	...	...
30^{s}	9·79	...	...	4·72	...	...
15^{s}	9·70	...	...	4·90	...	...
Mean	9·70			4·53		
Feb. 22.		No. 277.	*Mawson & Swan Plate.*	Photogr. Miss Rix.		
4^{m}	9·90	...	...	5·23	...	...
2^{m}	10 20	...	...	4·96	...	...
1^{m}	9·80	...	...	5·18	...	...
Mean	9·96			5·12		
Mar. 7.		No. 279.	*Mawson & Swan Plate.*	Photogr. Miss Everett.		
12^{m}	8·97	...	...	4·62	...	...
30^{s}	9·00	...	...	5·29	...	...
15^{s}	8·49	...	...	5·37	...	...
Mean	8·82			5·09		

Date and Exposure.	Value of c_1. AE.	ER.	WC.	Magnitude of Nova. AE.	ER.	WC.
Mar. 7.		No. 280.	*Mawson & Swan Plate.*	Photogr. Miss Russell.		
4^m	8·37	...	...	4·99	...	...
2^m	8·36	...	...	5·21	...	...
1^m	8·29	...	...	4·81	...	...
Mean	8·34			5·00		
Mar. 9.		No. 283.	*Ilford Plate.*	Photogr. Miss Everett.		
12^m	8·77	...	...	6·01	...	...
30^s	8·90	...	...	6·21	...	...
15^s	9·23	...	...	6·08	...	...
Mean	8·96			6·10		

Derived from comparison with a star, B. D. + 30° 898, mag. 5·7.

Date and Exposure.	Value of c_2. AE.	ER.	WC.	Magnitude of Nova. AE.	ER.	WC.
Feb. 1.		No. 247.	*Ilford Plate.*	Photogr. Mr. Criswick.		
7^m	...	...	...	...	...	...
Feb. 2.		No. 249.	*Ilford Plate.*	Photogr. Mr. Davidson.		
3^m	9·58	...	...	4·59	...	...
2^m	9·33	...	...	4·75	...	...
1^m	9·90	...	...	4·39	...	...
Mean	9·60			4·58		
Feb. 2.		No. 250.	*Ilford Plate.*	Photogr. Mr. Davidson.		
8^m	8·85	...	...	4·38	...	...
6^m	9·40	...	...	4·30	...	...
Mean	9·13			4·34		
Feb. 2.		No. 251.	*Lumière Plate.*	Photogr. Mr. Davidson.		
12^m	10·80	10·62	...	4·18	3·96	...
30^s	10·55	10·37	...	4·96	4·74	...
15^s	10·78	10·48	...	4·76	4·54	...
Mean	10·71	10·49		4·63	4·41	
Feb. 3.		No. 255.	*Lumière Plate.*	Photogr. Mr. Furner.		
4^m	9·38	8·63	...	4·30	3·42	...
2^m	9·58	8·65	...	4·17	3·77	...
1^m	9·68	8·73	...	3·72	3·64	...
Mean	9·55	8·67		4·06	3·61	

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Date and Exposure.	Value of c_2.			Magnitude of Nova.		
	AE.	ER.	WC.	AE.	ER.	WC.
Feb. 3.		No. 256.	*Lumière Plate.*	Photogr. Mr. Furner.		
8^m	8·95	8·45	...	3·83	3·70	...
6^m	9·10	8·10	...	4·23	3·98	...
Mean	9·03	8·28		4·03	3·84	
Feb. 3.		No. 257.	*Lumière Plate.*	Photogr. Mr. Furner.		
12^m	8·90	9·15	9·35	4·41	3·69	4·71
30^s	9·48	9·13	9·63	4·36	4·14	4·69
15^s	9·63	9·58	9·93	4·34	4·01	4·49
Mean	9·34	9·29	9·64	4·37	3·95	4·63
Feb. 12.		No. 262.	*Lumière Plate.*	Photogr. Miss Everett.		
12^m	9·33	9·05	9·28	4·54	4·49	4·88
30^s	9·45	9·58	9·73	4·64	4·06	4·51
15^s	9·83	9·53	10·13	4·34	4·11	4·18
Mean	9·54	9·39	9·71	4·51	4·22	4·52
Feb. 12.		No. 263.	*Lumière Plate.*	Photogr. Miss Everett.		
8^m	9·15	9·45	...	4·52	4·77	...
Feb. 13.		No. 264.	*Ilford Plate.*	Photogr. Mr. Criswick.		
8^m	9·45	9·15	...	5·12	4·75	...
6^m	9·58	8·80	...	5·04	4·83	...
Mean	9.52	8·98		5·08	4·79	
Feb. 13.		No. 265.	*Ilford Plate.*	Photogr. Mr. Criswick.		
12^m	9·60	8·70	...	5·20	5·07	...
30^s	9·48	8·78	...	5·85	5·24	...
15^s	9·58	8·83	...	6·00	5·34	...
Mean	9·55	8·77		5·68	5·22	
Feb. 13.		No. 267.	*Ilford Plate.*	Photogr. Mr. Criswick.		
4^m	9·53	8·60	...	5·58	4·71	...
2^m	9·48	8·20	...	5·86	4·96	...
1^m	9·53	8·53	...	5·71	4·96	...
Mean	9·51	8·44		5·72	4·88	

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Date and Exposure.	Value of c_2. AE.	ER.	WC.	Magnitude of Nova. AE.	ER.	WC.
Feb. 18.		No. 271.	*Ilford Plate.*	Photogr. Mr. Criswick.		
12^{m}	10·00	10·40	...	4·56	4·34	...
30^{s}	10·05	10·53	...	4·91	5·24	...
15^{s}	9·93	10·23	...	4·96	5·21	...
Mean	9·99	10·39		4·81	4·93	
Feb. 18.		No. 273.	*Ilford Plate.*	Photogr. Mr. Criswick.		
4^{m}	8·90	8·95	...	3·94	3·77	...
2^{m}	9·23	9·10	...	4·09	3·75	...
1^{m}	9·28	9·25	...	3·94	3·77	...
Mean	9·14	9·10		3·99	3·76	
Feb. 22.		No. 275.	*Mawson & Swan Plate.*	Photogr. Miss Rix.		
12^{m}	10·58	...	...	4·96	...	...
30^{s}	10·70	...	...	5·71	...	...
15^{s}	10·78	..	...	5·89	...	...
Mean	10·69			5·52		
Feb. 22.		No. 277.	*Mawson & Swan Plate.*	Photogr. Miss Rix.		
4^{m}	9·93	...	...	5·36	...	...
2^{m}	10·53	...	...	5·09	...	...
1^{m}	9·80	...	...	5·31	...	...
Mean	10·09			5·25		
Mar. 7.		No. 279.	*Mawson & Swan Plate.*	Photogr. Miss Everett.		
12^{m}	9·88	...	...	5·25	...	...
30^{s}	9·28	...	...	5·92	...	...
15^{s}	9·25	...	...	6·00	...	...
Mean	9·45			5·72		
Mar. 7.		No. 280.	*Mawson & Swan Plate.*	Photogr. Miss Russell.		
4^{m}	8·53	...	...	5·32	...	...
2^{m}	8·65	...	...	5·54	...	...
1^{m}	8·83	...	...	5·13	...	...
Mean	8·67			5·33		

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Date and Exposure.	Value of c_2.			Magnitude of Nova.		
	AE.	ER.	WC.	AE.	ER.	WC.
Mar. 9.		No. 283.	*Ilford Plate.*	Photogr. Miss Everett.		
$12^{\rm m}$	9·38	...	...	6·45	...	...
$30^{\rm s}$	9·18	...	...	6·65	...	...
$15^{\rm s}$	9·63	...	...	6·52	...	...
Mean	9·40			6·54		

In the values of the constant deduced by each measurer there appear to be no systematic differences between the long exposures and the short, and the mean of the values for the two or three exposures on each plate has therefore been used as the value of the constant for the plate. The range of exposures from $15^{\rm s}$ to $12^{\rm m}$, representing 4·2 magnitudes, corresponds approximately to the difference in photographic magnitude between the Nova and the 8–9 mag. comparison stars. It may here be explained that the constant c represents the magnitude of the star which, with an exposure $t^{\rm s}$, would give a diameter d'' for the photographic image, such that $\log t - 0{\cdot}97\sqrt{d} = 0$, or $\log t = 0{\cdot}97\sqrt{d}$. The following are the values of the exposure in seconds required to give the corresponding diameters of image for stars of magnitude $= c$.

Diameter.	Exposure.	Diameter.	Exposure.
″	s	″	s
1	9·3	3	47·9
1½	15·4	4	87·1
2	23·5	5	147·6

Thus, if we take the value of the constant c_1, found for Photo. 247 on February 1, we should have a star of 10·25 mag. photographed in $15\frac{1}{2}^{\rm s}$ with a diameter of $1\frac{1}{2}''$, which may be considered to give a distinctly measurable disc. It will be seen that the values of the constant on different nights and with different plates differ considerably, so that in some cases we should only get stars of 8½ mag. photographed, instead of 10¼ mag., with an exposure of $15\frac{1}{2}^{\rm s}$. The values of c_2 are generally greater than those of c_1, implying that the star B.D. + 30° 898 is photographically brighter than 5·7 mag., if we take the four 8–9 mag. stars as our standard. The photographic magnitude of B.D. + 30° 898 thus deduced from the mean of all the measures is 5·04, the difference between the determinations by Miss Everett and Miss Rix respectively being only 0·03 mag.

Both in the values of the constant (c_1 and c_2) and in the deduced magnitudes of the Nova (m_1 and m_2) there is decided evidence of personality between Miss Everett and Miss Rix, the mean values of AE—ER being

in c_1 + 0·34 mag.; in m_1 + 0·27 mag.; in c_2 + 0·39 mag.; in m_2 + 0·33 mag.

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The close correspondence between the values of the personality in c_1 and m_1, and in c_2 and m_2, respectively, would imply that the difference in the deduced magnitudes of the Nova results mainly from personality in the measurement of the comparison stars. This inference is supported by a comparison of my own results with Miss Everett's, though mine are hardly numerous enough to give any trustworthy determination of personality. The mean values found for AE − WC are

in $c_1 + 0{\cdot}35$ mag.; in $m_1 + 0{\cdot}39$ mag.; in $c_2 - 0{\cdot}24$ mag.; in $m_2 - 0{\cdot}14$ mag.

The values for AE − ER for the corresponding exposures being

in $c_1 + 0{\cdot}43$ mag.; in $m_1 + 0{\cdot}59$ mag.; in $c_2 + 0{\cdot}10$ mag.; in $m_2 + 0{\cdot}36$ mag.

The following table exhibits the magnitude of the Nova for each day, deduced from all the measures of each observer by comparison with the four 8–9 mag. stars, and with the 5·7 mag. star, respectively, the number of images of the Nova measured being indicated by the suffix; and the means for all the observers on each day. In forming these means it has been thought better not to apply any correction for personality, which must necessarily be subject to much uncertainty; but to take the simple mean of all the results by each observer, with weights proportional to the number of images of the Nova measured. The means m_1 and m_2 are formed from the comparisons with the four 8–9 mag. stars and the 5·7 mag. star respectively, and the final means in the last column are the means of m_1 and m_2, after applying a correction of − 0·66 mag. to the latter, to make them comparable, this being the difference between the assumed magnitude for this star (5·7) and that deduced from the photographs relatively to the four 8–9 mag. stars—viz., 5·04 mag.

Photographic Magnitude of Nova Aurigæ from comparisons with four stars 8–9 mag. with B.D. + 30° 898.

								Means Adopted.		
1892.		AE. mag.	ER. mag.	WC. mag.	AE. mag.	ER. mag.	WC. mag.	m_1 mag.	m_2 mag.	Mag.
Feb.	1	$4{\cdot}29_1$	$4{\cdot}60_1$	$4{\cdot}53_1$	...	...	...	4·47	...	4·47
	2	$3{\cdot}71_8$	$3{\cdot}14_3$	...	...	$4{\cdot}41_3$	...	3·55	4·50	3·70
	3	$3{\cdot}69_8$	$3{\cdot}45_8$	$3{\cdot}60_3$	$4{\cdot}17_8$	$3{\cdot}79_8$	$4{\cdot}63_3$	3·57	4·08	3·50
	12	$4{\cdot}23_4$	$3{\cdot}66_4$	$3{\cdot}46_3$	$4{\cdot}51_4$	$4{\cdot}36_4$	...	3·81	4·44	3·80
	13	$4{\cdot}50_8$	$4{\cdot}28_8$	...	$5{\cdot}55_8$	$4{\cdot}98_8$	...	4·39	5·27	4·50
	18	$3{\cdot}99_6$	$3{\cdot}72_6$	...	$4{\cdot}35_6$	$4{\cdot}40_6$	...	3·86	4·38	3·79
	22	$4{\cdot}83_6$	...	...	$5{\cdot}39_6$	...	...	4·83	5·39	4·78
Mar.	7	$5{\cdot}05_6$	...	...	$5{\cdot}53_6$	...	...	5·05	5·53	4·96
	9	$6{\cdot}10_6$	...	...	$6{\cdot}54_6$	...	...	6·10	6·54	5·99

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It would seem from these results that the Nova brightened decidedly from February 1 to February 3, when it was at its maximum; and that after diminishing considerably in brightness it attained a secondary maximum about February 18, since which date it has become gradually fainter. Unfortunately, owing to cloudy weather, the record is very imperfect. It will be remarked that the Nova appears to be much brighter photographically than it is to the eye, judging from the visual estimations of magnitude which have been published.

Royal Observatory, Greenwich:
1892 *March* 11.

Preliminary Note on the Magnitude of the New Star in Auriga.

Communicated by Professor C. Pritchard, D.D., F.R.S.

Observations of the magnitude of the new star in *Auriga* have been made at this Observatory on all available occasions, and the results are here presented to the Society. The determinations of magnitude have been made to depend both on photometric measures with the wedge photometer and on photographs taken with the 13-inch photographic telescope.

The Nova has been compared with the following stars, whose magnitudes have been assumed from the *Uranometria Nova Oxoniensis*:

χ Aurigæ	mag.	5·08
φ Aurigæ	,,	5·44
26 Aurigæ	,,	5·63
Lal. 10143	,,	5·84

The results of the comparisons with the wedge photometer are shown in the following table:

Date 1892.	Observed Photometric Magnitude.	Stars of Comparison.
Feb. 3	4·82	χ Aurigæ.
5	5·11	χ, φ Aurigæ.
7	4·96	χ, φ, 26 Aurigæ.
11	5·16	φ, 26 Aurigæ.
13	5·28	φ, 26 Aurigæ.
16	5·44	χ, φ Aurigæ.
18	5·60	φ, 26 Aurigæ, Lal. 10143.
22	5·51	26 Aurigæ, Lal. 10143.
28	5·64	φ, 26 Aurigæ.
Mar. 7	5·89	Lal. 10143.